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Automatic rotary car parking system

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ABSTRACT

Car parking in busy streets or even in huge commercial buildings is one of the most time-consuming tasks. Also, due to increasing number of vehicles, space efficient parking is not possible. The vehicles are parked in an unorganized manner on the streets. Also, safety of the vehicle is one of the main concerns. So, this proposed system, helps us to park vehicles in an organized manner. Each user is given a RFID tag. Each tag has details encrypted about the position where car is placed. This system also ensures safety and efficient use of parking space. As the system is automatic, the time consumed is reduced.

Keywords— Arduino Mega, RFID module, Vending, Coin counter

1. INTRODUCTION

In today's world, transportation plays a huge role in linking one part of a town or city to another. As the speed of our life is increasing, the demand to perform every task easily with great speed is a necessity. Also, as the population is increasing rapidly, there is huge growth in the number of vehicles. There is a dire need to manage the parking of these vehicles. The most common issue while parking is over crowding of the vehicles in a small congested area. This leads to wastage of time and in way wastage of fuel also.

The goal of our technology is to ease the process of parking and reduce the load. So here we have developed an automatic parking system, which can automatically manage the number of cars inside the compact parking area. It also has the facility to inform person trying to park his vehicle, whether a space to park vehicle is available or not. In this project we have used an Arduino Mega Microcontroller which used to sense the movement of cars and depending upon whether there is a capacity of cars to enter, it either open or close.

Mechanical car lifters are used to lift the cars to a level for proper parking with the help of microcontroller. With the

help of Automation requirement of space is reduced and also human errors, which results in the highest security and greatest flexibility.

2. PROPOSED METHOD

Automation is completed to scale back demand of the area and additionally to scale back human errors, that in-turn leads to the highest security and greatest flexibility. Due to these benefits, this system can be used in hotels, railway stations, airports where crowding of the car is more.

The multistoried car parking system is very essential in the modern world where a number of vehicles is increasing day by day and parking spaces in public, as well as private areas, are not sufficient.

This project deals with an identical downside and as an answer, the system is developed wherever anyone will park a lot of variety of vehicles during a smaller area.

2.1 Proposed block diagram

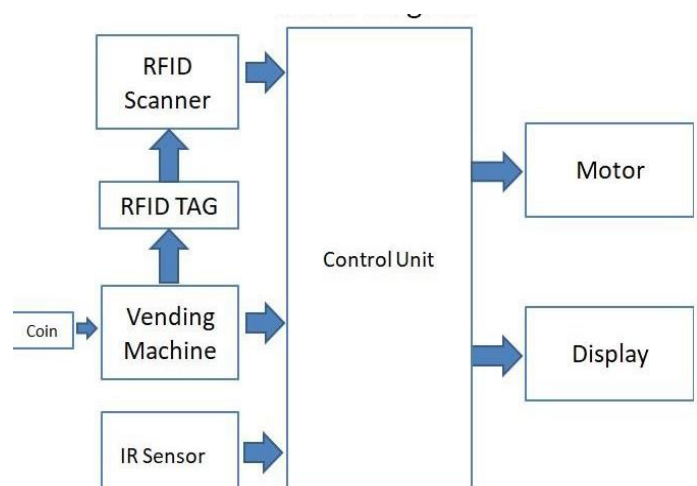


Fig. 1: Block diagram

2.1.1 RFID Card: RFID Cards have numerous vary of functions, whereas provides convenience because the cards should merely be waived before of a reader instead of swiped.

These cards are used for applications as access management in security systems, time and attending, network login security, biometric verification, cashless payment, and even event management.

2.1.2 RFID reader: An RFID Reader may be a device that's accustomed interrogate associate RFID tag. The reader has an associate constitutional antenna that emits radio waves; the tag responds by sends back its information.

2.1.3 Microcontroller: Microcontroller senses the signal given from switches and decides the mode of operation that is drive the motor of the parking system.

It fetches information from memory location and sends it to output devices like show, motor driver and buzzer.

At the same time, it can accept data from Keypad for recharging options and from IR receiver to sense that vehicle on parking pallets.

2.1.4 Vending machine: An Arduino base vending machine is used in the project. The vending machine is us Ed for costing purpose. It is having RFID scanner on it to call the pallet having a user's vehicle.

2.1.5 DC Motor: DC Motor is used to open the Gate. This will be done once the user has with success performed the RFID swap operation with adequate balance.

3. FLOWCHART

3.1 Parking

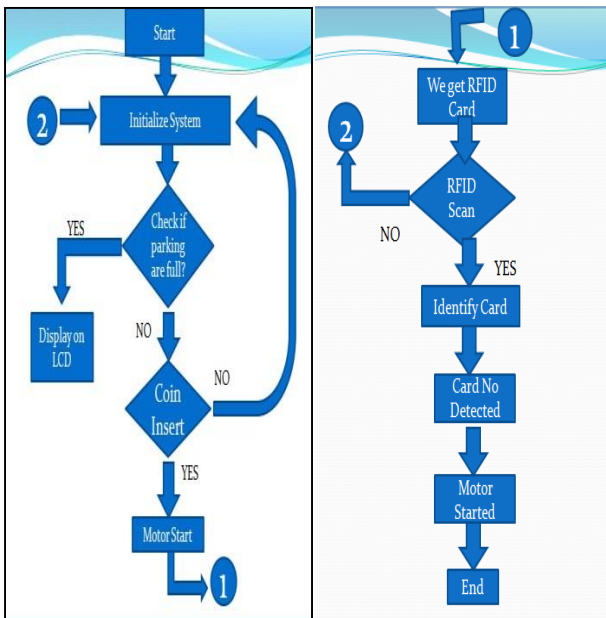


Fig. 2: Flowchart of parking of a vehicle

In the beginning, the system is initialized by inserting a coin. The coin is detected in the coin counter. The weight and dimensions are matched to the predefined data. If the coin is accepted, the vending machine will give the RFID tag. Each tag is assigned a respective pallet. When the user scans the RFID tag given to him, the motor turns on and the assigned pallet is moved to the initial position.

3.2 Unparking

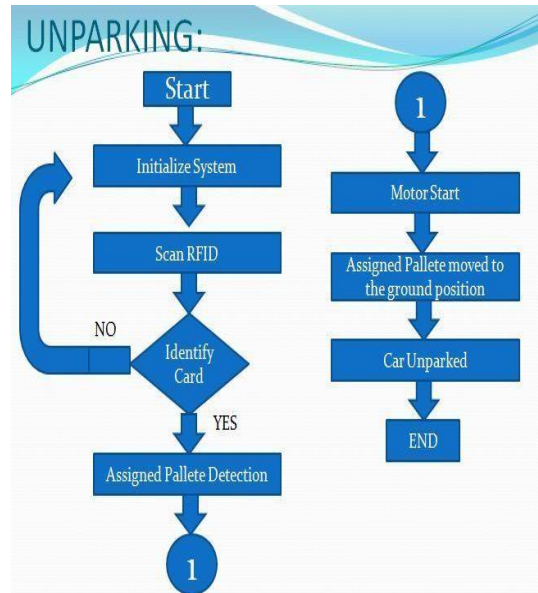


Fig. 3: Flowchart of unparking vehicle

4. CIRCUIT DIAGRAM

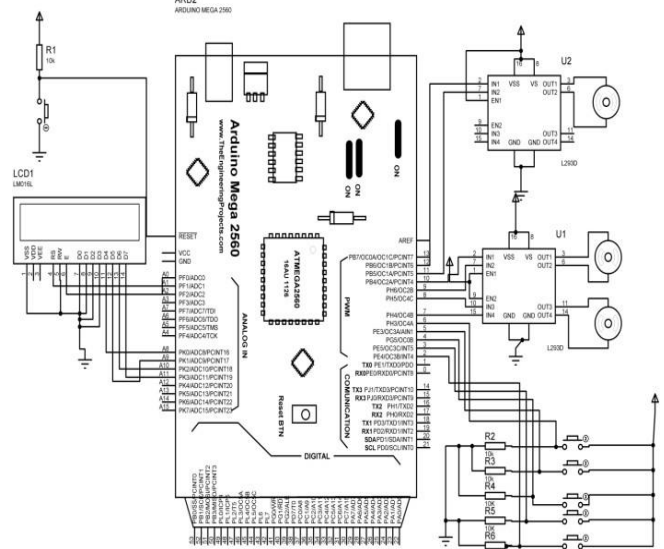


Fig. 4: Circuit diagram

When the sunshine emitted by the IR crystal rectifier is incident on the photodiode once hit AN object, the resistance of the photodiode falls down from a large price.

One of the inputs of the op-amp is at a threshold price set by the potentiometer. The other input to the op-amp is from the photodiode's series resistance. When the incident radiation is a lot of on the photodiode, the dip across the series resistance is going to be high.

In the IC, each the edge voltage and therefore the voltage across the series resistance square measure compared.

If the voltage across the resistance series to photodiode is bigger than that of the edge voltage, the output of the IC Op – Amp is high.

As the output of the IC is connected to a crystal rectifier, it lightens up. The threshold voltage is adjusted by adjusting the potentiometer counting on the environmental conditions. The IR sensors are then connected to relay board for further operations Vishal Arun Tayade et al.; International Journal of

The next section is the relay board. An opt coupler is a device which capsules an LED and a photo-transistor inside a hermetically sealed, water proof, light proof package in the form of an 8 pin IC (resembling a 555 IC).

The LED is terminated over a couple of pin outs, while the three terminals of the photo-transistor are terminated over the other three assigned pin outs. The idea is simple, it's all about providing an input DC from the source which needs to be isolated to the LED pin outs via a limiting resistor (as we normally do with usual LEDs) and to switch the photo transistor in response to the applied input triggers.

5. HARDWARE STRUCTURE

There are different types of material used to implement this car parking system such as:

- EN8, Aluminum sheet, Aluminum bars
- EN8 material is selected on the basis of cost and its hardness. Aluminium sheets are used to create 4 pallets to park the cars and aluminium bars is used for pallet support. The car parking structure is as shown in the figure.

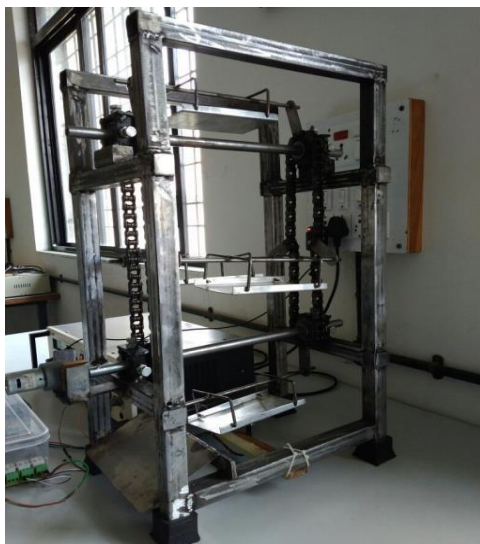


Fig. 5: Hardware structure

The figure shows the complete pictorial of the Rotary Car Parking System. Where all the car pallets are controlled. The system works on automatic as well as manual mode. In auto mode, the particular pallet comes to ground position automatically where as in manual mode it can be controlled according to need. This system is very efficient as compared to cost, area consumed and simplicity in hand.

6. VENDING MACHINE

This machine has a coin counter which will detect and accept the coin inserted. The LCD display is used to display the instructions while parking and unparking. When the coin is inserted, the RFID tag is given with the help of a rack and pinion motor. Each card has details encrypted on it. While unparking, the same tag is to be scanned here at the machine. EM18 reader module is used to scan the tag. When the tag is scanned, the assigned pallet is moved to the initial position so that the user can unpark the car.



Fig. 6: Coin acceptor in the vending machine

7. CONCLUSION

This proposed system provides lower building cost per parking slot, as they optimum parking solution. Fast parking typically requires less building volume and process in which the driver does not have ground area than a conventional facility with the same capacity.

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